

who will.¹⁹ If a party believes in good faith that a particular licensee is not complying with the construction and operation requirements of Part 101, such party should be authorized to serve the licensee (by some method verifying proof of receipt) and the Commission with a statement of the facts supporting the claimed rule violations, accompanied by documentary evidence of the non-compliance. At the same time, the finder would be authorized to submit an application for new MAS facilities which has been fully coordinated with all other affected co-channel licensees, assuming that its finder's preference will be granted and the alleged offender's station is no longer in issue.

The target licensee would be given 45 days to rebut the finder's finding with objective evidence of construction and/or operations.²⁰ If the licensee fails to rebut the finder's case, the Commission would revoke its license and, subject to Commission review of the acceptability and

¹⁹ See, e.g., the Part 90 finder's preference programs for the 220-222 MHz, 470-512 MHz and 800/900 MHz bands (not including frequencies designated exclusively for SMR service). § 90.173(k). The Commission has recently issued an NPRM proposing to eliminate the finder's preference for these bands. However, the reasons cited by the Commission for doing so are not relevant to MAS. Specifically, the Commission cited to the program's incompatibility with geographic licensing and competitive bidding with respect to the 220 MHz band, and to the apparent low use of the program in the 470-512 and 800/900 MHz bands. *See In the Matter of Amendment of Part 90 Concerning the Commission's Finder's Preference Rules*, WT Docket 96-199, *Notice of Proposed Rule Making*, 11 FCC Rcd 13016 (1996). However, where geographic licensing and competitive bidding are not applied, and significant amounts of unconstructed stations impede licensees in obtaining spectrum, a finder's preference would remain a valuable tool for maximizing frequency utilization and administrative efficiency.

²⁰ CellNet believes that in many instances the licensee is no longer in business. In such cases, the finder should be authorized to serve the licensee at the address last provided in the FCC's database. If service cannot be achieved at that address within seven days, the finder should be able to provide documentary evidence of reasonable efforts to trace the licensee, or evidence that it is no longer in business. If the FCC accepts the evidence that the licensee cannot be found and the finder's evidence that the station is not constructed or no longer operating, it can void the license without further contact with the licensee.

grantability of the finder's application, the agency would simultaneously grant the finder's request and the finder's application. If the Commission found the target licensee's rebuttal to be sufficient proof of compliance, the Commission would issue a determination that the target licensee is in compliance with the rules and dismiss the finder's request and application. To protect against harassing filings, all preference request information provided by the finder should be filed under oath or under penalty of perjury pursuant to Section 1.16 of the Commission's Rules. In addition, to the extent that the Commission determined that the request failed to make a *prima facie* case against the target or was filed with any malevolent intent, the Commission could order that the finder whose request was denied would be foreclosed from filing another finder's preference request for one year as to any station facilities located within 135 miles of the location for which the finder's preference was filed.

A finder's preference program can promote efficiency and fairly reward those entities that discover and put to good use unused spectrum. It will allow the industry to police itself and will assist the Commission in ensuring that all licensed frequencies are in use. Together with the auctioning of other MAS bands that currently are unused, the adoption of such a program should assure that MAS spectrum is in good supply for the foreseeable future.

III. MAS Licensing

A. Site-By-Site Licensing in the Private MAS Bands

The Commission has generally proposed the use of geographic area licensing for the MAS Bands. It has, however, recognized in the *NPRM* that if the principal use of the Private MAS Bands will be for private systems, it may continue to award MAS licenses on a site-by-site basis. CellNet strongly supports such a licensing approach.

As already noted, CellNet believes that the current licensing scheme has generally worked quite well in the Private MAS Bands to create opportunities for a wide diversity of service offerings and technological developments in the band. Companies like CellNet, Radscan, Inc., GTECH Corporation, and Itron have developed a variety of networks for use in wireless meter reading, lotteries and alarm monitoring. And these varied devices have been developed alongside more conventional point-to-multipoint operations of utilities, paging companies and other industrial users.

Just as site-by-site licensing has provided a good vehicle for the successful deployment of these bands for a wide variety of uses, geographic licensing could have disastrous consequences for the future use of the band. Since the band will be primarily for “private systems” it is not appropriate for licensing by auction. If the Commission nevertheless went to geographic licensing, the likely demand for channels by the variety of current licensees who already operate in each service area would likely result in the filing of mutually exclusive applications for virtually every new license. The attendant delays inherent in either the lottery or hearing process necessary to resolve such mutual exclusivity would clearly disserve the public interest. Moreover, while site-by-site licensing allows each licensee to tailor its application to the area of greatest interest, geographic area licensing necessarily creates territories within a designated geographic area where the licensee has no real interest in providing service.²¹

The site-by-site licensing approach has worked well; mutual exclusivity has generally been avoided, and through short-spacing and effective frequency coordination, the Private MAS Bands have been put to substantial use. While there are areas of spectrum congestion, CellNet

²¹ While partitioning and disaggregation policies may allow a licensee to assign such areas to those entities who are most interested in them, this necessarily creates delays in the provision of service to the public.

believes that these problems will, over time, be relieved through finder's preference programs and the natural migration of some current and future operations to the newly auctioned spectrum. Site-by-site licensing should therefore be retained for those portions of the MAS Bands that are not being auctioned.

B. Geographic Licensing

For those MAS bands which will be subject to competitive bidding, CellNet believes that a geographic licensing approach is appropriate for assigning such spectrum. The Commission could continue to rely on each party to develop its own system plans on a site-by-site basis and then limit the competitive bidding to those in which mutual exclusivity exists; but the likelihood of an impossibly cumbersome auction process that would result makes such an approach infeasible. So long as incumbents can be adequately protected from the newly authorized geographic service area licensee — and past auctions in the MDS and SMR services suggest that such mechanisms can be adequately created — geographic area licensing will provide a reasonable mechanism for assigning licenses that also cover areas for which no MAS service currently exists. In the 932/941 MHz Bands which are, for the most part, unoccupied, a geographic licensing approach can provide licensees with sufficient population density and geographic territory to permit the development of a variety of new products and services to complement the existing uses of the MAS bands, all of which could provide valuable benefits to the public.

C. Different Sized Service Areas Are Appropriate for the Different MAS Bands

The Commission has proposed the use of Economic Areas ("EAs") in licensing the MAS spectrum. In the Commission's view, EAs "offer the advantage of being large enough to permit

viable wide-area service, while also reducing the Commission's administrative burden."²² The Commission goes on to note that EAs appear to "best mirror the size and development of existing MAS systems."²³

CellNet agrees that EAs may be an appropriate licensing area for the 932/941 MHz MAS Band (the "Open MAS Band"), in which future licensees may choose to operate on a wider area basis, particularly as more subscriber-based service offerings are deployed on this spectrum. This band is virtually unused today. To the extent that larger areas will enhance the development of new technologies and services in these point-to-multipoint channels, then the use of EAs is entirely appropriate for such virgin spectrum.

CellNet does not, however, agree that such large areas provide an appropriate licensing mechanism in those MAS Bands in which there are incumbent systems. Contrary to the FCC's view of the current developments in the MAS Bands, it has been CellNet's experience that most MAS systems are limited in area (primarily by the ninety mile co-channel protection distance) to a service area much smaller than the EAs delineated by the Commerce Department.²⁴ Given this trend toward smaller-sized existing incumbent systems, the number of incumbents on any channel in any given EA could create enormous technical and administrative coordinating burdens on the geographic licensee which would substantially devalue the license.²⁵ To avoid

²² *NPRM* at ¶ 17.

²³ *Id.*

²⁴ For example, the system that would meet CellNet's current contractual obligations to Northern States Power would cover less than 58% of the population of the EA in which the utility operates.

²⁵ MAS spectrum is characterized by numerous entrepreneurial enterprises, sometimes competing for the same spectrum, but rarely competing in the same mar-
(continued...)

these problems, CellNet believes that smaller license areas should be used to license any MAS bands in which there are incumbent licensees, for example any portion of the Private MAS Bands that are subjected to licensing through competitive bidding.

In those areas, CellNet proposes the use of the Commerce Department's Component Economic Areas ("CEAs"), which would better reflect and accommodate existing uses and users. Just as BTAs combine to form MTAs, CEAs are the smaller geographic areas that combine to form the larger EAs. Each CEA consists of a single "economic node"²⁶ and the surrounding counties that are economically related to the node. The Commerce Department has designated a total of 348 CEAs within the United States.²⁷

In CellNet's view, incumbents are likely to find individual CEAs more valuable, because the smaller CEAs will either generally mirror existing system contours or provide existing licensees with a cost-effective opportunity for combining CEAs in a manner which matches existing areas of operations or allows for reasoned expansion. EAs, on the other hand, will generally be too big for any existing incumbent to find valuable. Moreover, use of CEAs would

²⁵ (...continued)

kets. This is quite different than other services in which the Commission has auctioned spectrum containing incumbent licensees, *e.g.*, MDS and SMR spectrum. Those services were characterized by substantial consolidation of incumbent licenses, so that larger service territories were appropriate — yet in each of those cases, the smaller BTA designation was used. Since the vast majority of MAS stations are stand-alone systems which are not developed over wide areas, but rather confined to their individual service areas, the number of incumbent licensees in any given EA would make coordination with the geographic area licensee extremely burdensome.

²⁶ Economic nodes are metropolitan areas or similar areas that serve as centers of economic activity.

²⁷ In many of the less populated areas of the country, the border of the EA and the CEA are identical. These are, however, also the areas where there are likely to be fewer incumbents vying for the license.

allow existing or new licensees with more grand system designs the flexibility to combine CEAs in order to obtain EA-sized markets, if that is the size needed to suit their developmental plans. The smaller CEAs also will provide substantially more opportunities for licensing to rural telephone companies, women- and minority-owned business and smaller business entrepreneurs. Such enterprises may find the size and expense of licenses in an EA-sized market too large in relation to the territory they can afford to develop, but should find CEA sized markets more affordable, not only for the license, but also in terms of capital expenditures needed to develop a viable, stand-alone MAS network.²⁸

D. Protection for Incumbents

The Commission has appropriately proposed to allow incumbent licensees to remain in any bands that are subsequently licensed on a geographic area basis. CellNet agrees; there is simply no basis to move any existing licensee out of the band involuntarily. New geographic area licensees should be free to negotiate for the removal of incumbents, and to pay such incumbents to move or terminate their systems without restriction on compensation provided to do so. But the public interest cannot be served by requiring valuable service providers to terminate their offerings by reason of a new licensing scheme.

CellNet also applauds the determination to provide primary protection to the incumbent licensees in a CEA or EA, requiring the newly licensed geographic area licensee to provide

²⁸ While the Commission has relied in other services (and may also rely here) on the partitioning and disaggregation of spectrum to satisfy some of these designated entities' interests, such approaches place as much administrative burden on the Commission's licensing staff as an original allocation of licenses in smaller geographic areas which encourages these designated entities to participate in the auction process and obtain their licenses directly from the Commission rather than in the after-market from the winning bidder at the auction.

protection to all co-channel systems licensed within their geographic service area. The Commission properly utilizes the existing MAS mileage separation or short-spacing requirements already in the rules. However, it should further clarify that if interference nevertheless occurs between an incumbent and a new geographic service area licensee, then the new geographic area licensee will be required to resolve the interference problem, at its expense.²⁹

CellNet also agrees with the Commission's decision to accord incumbents some flexibility to modify or augment their existing systems as long as there is no expansion of their operations. In the *NPRM*, the Commission has proposed the use of an assumed 25-mile protected service area; an incumbent could make modifications to its network or add new transmitters anywhere within its service area as long as the signal level is not increased outside of the 25-mile radius service area. It appears that the proposed 25-mile area is based on the current mileage separation for mobile-to-mobile stations in the 928/952/956 MHz bands.

However, CellNet believes that the more appropriate basis for determining the protected service area of an incumbent system is the fixed-to-fixed separation. Given that incumbents are required to protect co-channel systems that are 90 miles away, CellNet believes that the appropriate service area of an incumbent should be defined by a 45-mile radius. So long as

²⁹ CellNet also urges adoption of a "finder's preference"-like program for the benefit of new geographic service area licensees in areas where there are incumbent licensees as well. To the extent that a new licensee can demonstrate by *prima facie* evidence that the incumbent failed to meet its initial construction requirements or has ceased operation, that new licensee should be able to obtain expedited review of its showing and the right to immediate revocation of the incumbent's license. This will assure that only those incumbents who have complied with their FCC obligations are given the benefit of protection, and will protect geographic service area licensees from the possible use of "greenmail"-like tactics from incumbents who have done nothing to develop the channels.

modifications within the service area do not create interference to co-channel licensees at the 45-mile radius border, any such modifications would be allowed.

E. Spectrum Block Size and Spectrum Caps

The Commission has proposed to license the MAS Bands on a channel-by-channel basis. CellNet supports this approach since it provides substantial flexibility for existing and future users of this spectrum. Systems that need less spectrum can be accommodated on smaller channels, while technology that requires a broader bandwidth can consolidate on larger channels.

The Commission has also tentatively concluded that it will not impose any limit on the number of channels that a single licensee may hold in any geographic area. CellNet disagrees, and urges reconsideration of this decision. Rather, reasonable limits can and should be imposed on the number of channels licensed to any entity in a particular geographic area in order to ensure efficient use of MAS spectrum.

The Commission suggests that excessive concentration and warehousing of spectrum may not be a concern in this service. While it is true that there are a number of channels available in any given area, the Commission has already seen speculation and warehousing in these bands. There is no reason to believe that, given the potentially lower values for the MAS spectrum than spectrum in other radio services available from the Commission, some well-heeled entities would not attempt to corner the MAS market for future opportunities. And there is no evidence that reasonable limits on the amount of spectrum held by any entity will stifle innovation or otherwise encumber opportunities for licensees in these bands to fully develop their intended businesses.

To that end, CellNet believes that higher channel limits can be utilized in the Open MAS Band, which is currently unencumbered spectrum, in order to provide maximum flexibility for

the development of new technologies and services. A 100-kHz spectrum cap should therefore be imposed on licensees in the 932/941 MHz bands. However, for the encumbered bands, CellNet believes that the Commission should retain its *de facto* limit of 50-kHz. A 50 kHz cap, reflected in Part 101, has worked well to date, providing opportunities for numerous entrepreneurial enterprises to develop the band within a particular area without stifling innovation. Allowing any entity to obtain more than 50-kHz in these bands may encourage spectrum warehousing, create even more congestion, and increase the potential for inefficient operations.³⁰

F. Partitioning and Disaggregation

In the *NPRM*, the Commission has proposed to adopt for MAS licensees the same types of flexibility for partitioning and disaggregation of spectrum that has been made available recently in the Broadband PCS services, and proposed for other wireless licensees. CellNet supports these conclusions. MAS licensees should be allowed to partition their licenses along any geographic area that the parties may define. In so doing, the parties should also be able to allocate construction responsibility between them, consistent with the need for either the partitionee to certify its willingness to meet the same construction obligations as the original licensee, or the licensee to certify that it has or will satisfy the construction requirement imposed on the entire license area.³¹

³⁰ It should also be made clear that the overall limit on MAS spectrum is 100 kHz, of which no more than 50 kHz can be held in the encumbered Bands. Also, as in the application of the CMRS spectrum cap, the limit should apply to licensees and to any entity that holds either a controlling interest in a licensee or any non-controlling interest of at least 20% in the licensee, using the FCC's standard multiplier test to attribute indirect interest in a licensee.

³¹ These are the requirements imposed on Broadband PCS licensees. *See In the Matter of Geographic Partitioning and Spectrum Disaggregation By Commercial* (continued...)

CellNet also supports the Commission's proposal to allow licensees to freely disaggregate spectrum. CellNet does not believe that the Commission needs to impose a minimum amount of disaggregated spectrum that would be allowed. If MAS systems can be operated efficiently on decreasing amounts of spectrum, such efficiencies should be encouraged by allowing licensees to assign portions of their licensed spectrum to others. This will be particularly useful in the MAS bands, where channel allocations of 12.5 and 25 kHz already allow for varying bandwidths in system development.³² To ensure maximum flexibility, combined partitioning and disaggregation should also be permitted. Finally, CellNet agrees that partitionees and disaggregatees should hold their licenses for the remainder of the original licensee's license term, and should be afforded the same renewal expectancy.

IV. Construction Requirements

The Commission has proposed to retain the current 18 month construction requirement for incumbent licensees; under this approach, an incumbent licensee must place into operation at least one base station and four remotes within the 18 month period. Assuming that a finder's preference program is adopted for the Private MAS Bands, and that geographic licensees are given similar rights to expedite the revocation of an incumbent's license if it fails to meet this construction obligation, CellNet agrees that the 18 month construction requirement should remain in place for incumbents.

³¹ (...continued)

Mobile Radio Services Licensees, WT Docket No. 96-148, *Report and Order and Further Notice of Proposed Rulemaking*, 5 Comm. Reg. (P & F) 634 (1996).

³² As with the disaggregation policies, either party should be allowed to certify that it assumes responsibility for complying with applicable construction requirements.

CellNet also supports the Commission's proposal to impose a different construction requirement on geographic area licensees. Clearly, the area of coverage for such licensees will in many cases extend far beyond the range of a single base station and four remotes. On the other hand, such licensees should be given the technical flexibility to design networks that satisfy the demand within their geographic area; they should not be forced to make modest construction simply to meet an artificially quick deadline. The five-year benchmark proposed by the Commission should provide an adequate incentive for licensees to develop the spectrum and not warehouse it. CellNet believes, however, that in lieu of relying solely on a subjective "substantial service" test at the ten-year benchmark, licensees should be able to satisfy the standard if they have constructed a system that provides coverage to at least three-fifths of the population of the licensed service area.

V. OPERATIONAL AND TECHNICAL FLEXIBILITY

The Commission has proposed to provide both incumbents and new MAS licensees substantial operational and technical flexibility. As a general matter, CellNet strongly supports such an approach. CellNet has been the beneficiary of the Commission's foresight in granting waivers of technical regulations that could have stifled CellNet's development. The Commission has also responded favorably and expeditiously to CellNet's proposal for permanent rule changes to allow the type of technical flexibility in subdividing channels that has allowed CellNet to accomplish substantial spectral efficiencies. With few exceptions needed to assure that other licensees are not significantly impacted in their independent use of the MAS bands,

CellNet believes the Commission should maximize licensee's flexibility to innovate on the MAS channels.³³

CellNet also supports the Commission's proposal to increase the operational flexibility afforded to licensees in the MAS spectrum. While the band should retain as its primary purpose the provision of point-to-multipoint services, CellNet believes that greater flexibility can be provided in bands not previously licensed, *i.e.*, the Open MAS Band. In these channels, point-to-point operations can be permitted on a secondary or ancillary basis to the primary point-to-multipoint uses. However, in the Private MAS Bands, where the spectrum has been rather fully developed for point-to-multipoint purposes, point-to-point operations should not be permitted. CellNet believes that opening this band to point-to-point operations could vitiate the very nature of the already established point-to-multipoint operations.

CellNet does not oppose the use of any of the MAS spectrum for mobile operations, so long as such mobile services are not interconnected with the public switched network. As the Commission has properly noted, when services are PSTN interconnected, the regulatory regime which must be imposed on such offerings becomes more complex. Not only would such services be likely to require CMRS-type regulation, but the offering of such interconnected subscriber-based services could severely decrease the value of the spectrum for traditional MAS systems. There are more than enough other radio services in which to satisfy the need for interconnected mobile communications.

³³ To that end, CellNet supports the Commission's proposal to apply out-of-band emission limits only at the band edge of the licensee's service area (and, of course, at the edge of the service area of any incumbent licensees). Within the service area, there should be no limit on emissions unless such emissions would cause co-channel or adjacent channel interference.

VI. AUCTION ISSUES

The Commission has tentatively concluded that it will apply the generic auction procedures to any competitive bidding for MAS spectrum. CellNet understands that multiple round, simultaneous auctions have, in the past, been long, complex and burdensome on the ongoing business operations of participating licensees. However, CellNet also recognizes that the auctioning of MAS spectrum on an EA or CEA basis will create a number of interdependencies among markets and licenses. The ability for participants to regularly review and revise strategies that is inherent in this type of auction will be critical to entities like CellNet, who intend to utilize the MAS Bands to meet both current and future spectrum requirements. Therefore, use of the generic auction procedures is appropriate.

CellNet has recently participated in the Commission's generic proceeding³⁴ to review and revise the general auction procedures. Rather than repeat CellNet's comments in the context of the MAS auction, a copy of CellNet's Reply Comments is attached hereto as Appendix II and made a part hereof. As noted therein, CellNet is most concerned that the criteria adopted for eligibility for any financial incentives provided to a "small business" should not be so broad as to invite large, well-financed entities to participate through specially created "sham-like" applicants. CellNet is also concerned that bidding procedures should not add to the already complex burden imposed on small businesses, or otherwise prejudice the ability of a small business to participate meaningfully in the MAS auction process.

Also as noted in those comments, CellNet urges the Commission to expedite the resolution of this proceeding or lift the freeze on applications, amendments and modifications to

³⁴ *In the Matter of Amendment of Part 1 of the Commission's Rules -- Competitive Bidding Proceeding*, WT Docket No. 97-82, *Memorandum Opinion and Order and Notice of Proposed Rule Making*, FCC 97-60 (released Feb. 28, 1997).

existing licenses. CellNet continues to expand its network in accordance with the available exceptions to the freeze. But until such time as the issues addressed in the *NPRM* concerning the future use of the Private MAS Bands are resolved, CellNet does so at some peril to its ability to fully utilize any spectrum so licensed. The impact of a freeze on licensees is enormous. It is therefore incumbent on the FCC to act expeditiously to remove the freeze as soon as possible.

CONCLUSION

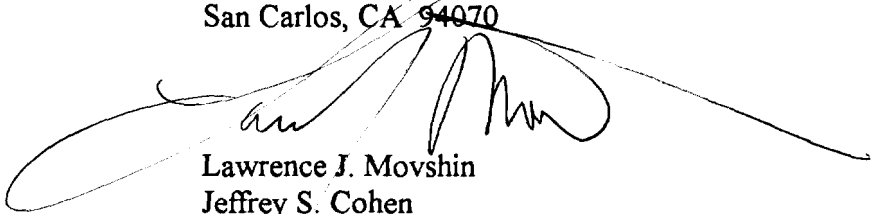
CellNet believes that the proposed exclusive allocation of the Private MAS Bands is unnecessary and should not be adopted. There are less onerous alternatives which would protect the availability of spectrum for private internal MAS uses yet be conducive to current and future uses of these bands, and save incumbents the extreme hardships resulting from having to convert systems for operation in different MAS bands. In any case, it is paramount that all services provided by incumbents remain fully protected, and that incumbents in bands reallocated for strictly private internal use be afforded a reasonable transition period.

CellNet therefore urges the Commission to act expeditiously to adopt rules and regulations governing the future use of the MAS Bands consistent with the Comments set forth herein, in order to maximize spectrum efficiency and foster beneficial uses of the MAS bands, both for incumbent licensees and future developers of MAS technologies and services.

Respectfully submitted,

CELLNET DATA SYSTEMS, INC.

David L. Perry
Vice President, General Counsel and Secretary
125 Shoreway Road
San Carlos, CA 94070



Lawrence J. Movshin
Jeffrey S. Cohen

WILKINSON, BARKER, KNAUER & QUINN
1735 New York Avenue, N.W.
Washington, D.C. 20006
(202) 783-4141

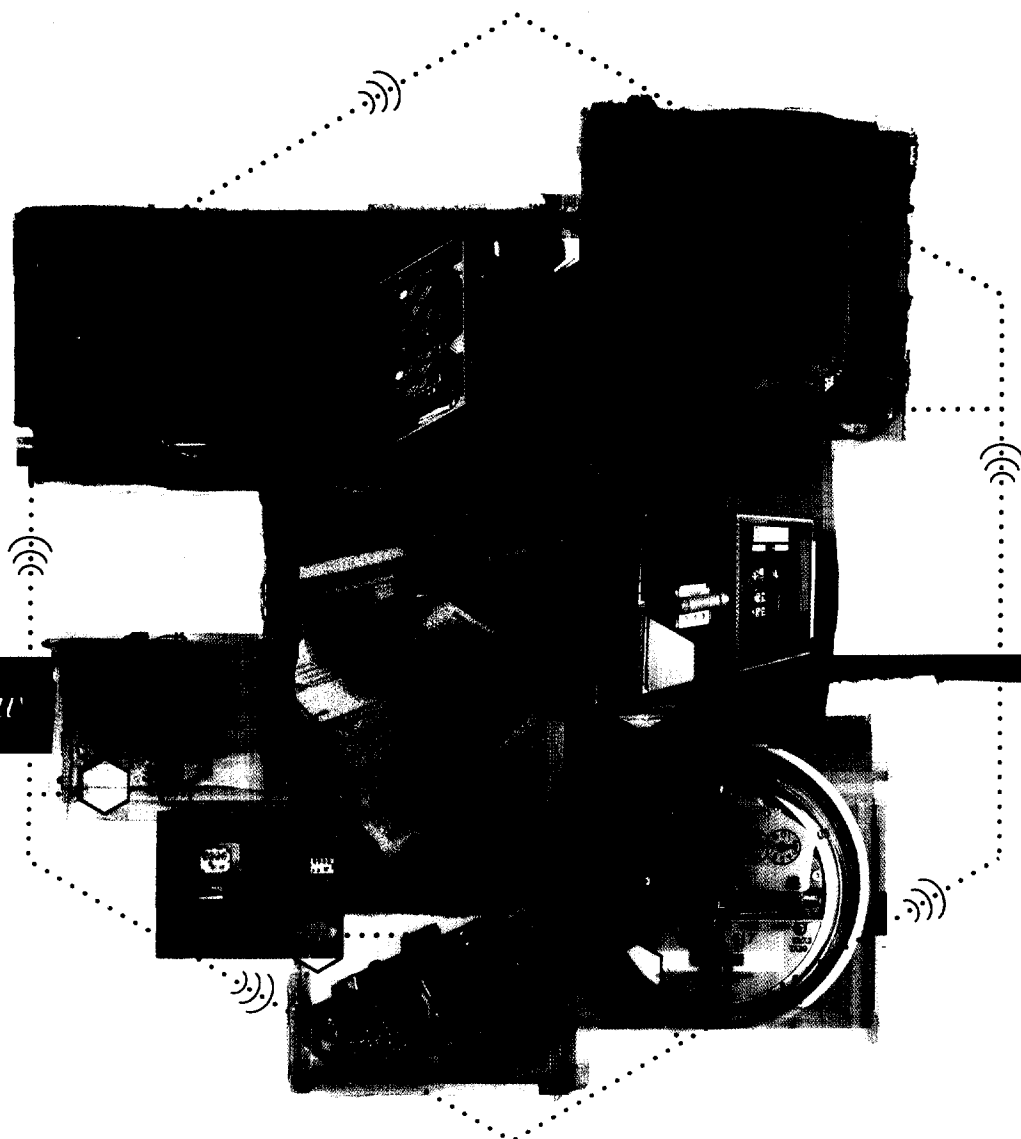
Its Attorneys

April 21, 1997

APPENDIX I

Pictorial Description of the CellNet System

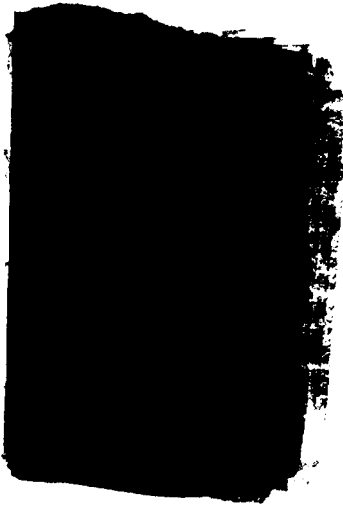
CellNet Wireless Data Network: *how it works*



System Overview

CELLNET
DATA SYSTEMS

Enabling technology *for a competitive edge*



Helping utilities win

CellNet provides powerful, leading-edge network information services that enable utilities to stay ahead in a fast-changing environment. By harnessing the power of real-time information, utilities can gain a competitive advantage. With access to more information about their customers and business processes, utilities can improve customer service and operational efficiency while preparing for the future.

CellNet offers a broad range of network information services including Network Meter Reading (NMR) and distribution automation (DA) communications services. And thanks to CellNet's unique services approach, utilities can gain full access to this enabling technology with limited capital outlay and minimum technological risk.

New possibilities with NMR

Progressing beyond the automation of a monthly meter reading process, CellNet's forward-thinking NMR delivers more—and much more valuable—data than ever before. Information provided by CellNet's NMR services enables electric, gas, and water utilities to deliver differentiated service offerings such as new pricing options, consolidated billing, selectable bill dates, and value-added energy usage information. With on-line access to daily usage, total usage, and real-time usage data, utilities can respond immediately to customer inquiries.

By retrofitting existing electric, gas, and water meters with CellNet Communications Modules, utilities are able to perform remote meter reading, on-demand reads, automated detection of outages, faster outage restoration, and on-line restoration verification—all on an individual meter-by-meter basis.

Utilities can manage energy much more efficiently too, with flexible rate structures such as time-of-use rates, energy theft and tamper detection, improved line loss analysis, and remote connect/disconnect upon customer move in/out.

More efficient distribution

In addition to NMR, CellNet provides the communications link for distribution automation. Real-time information access along all points of the distribution system helps utilities better monitor and more efficiently manage power after it leaves the substation.

By accessing real-time information in feeder monitoring, switch and capacitor bank control, and outage detection activities, utilities can dynamically balance loads, locate and resolve outages quickly, and troubleshoot real or potential failures more easily. Maximizing a

utility's current investments, the CellNet system is easily integrated with existing utility EMS or SCADA systems.

A proven partner

When it comes to leading-edge technology, experience counts. CellNet is the number one provider of network information services to energy utilities. The company's proven, large-scale network management capabilities and reputation for delivering on-time with the highest degree of dependability, demonstrate its commitment to long-term, winning partnerships with its utility customers.

New Business Opportunities

In a nonregulated environment, utilities will need new products and services to generate new sources of revenue. Utilities that choose the CellNet system are well positioned to take advantage of these opportunities because the CellNet network can be easily extended to other commercial wireless data applications.

For example, a utility can now offer a communicating "smart thermostat" device to residential customers, then offer value-added services that take advantage of the two-way communications channel: real-time energy pricing information, power outage notifications, home security services—even access to school closing notices and weather reports. The possibilities are many, and this is just the beginning.

AMR enables: NMR enables:

Network Meter Reading: Raising the Bar

A complete *and integrated solution*



Closer ties with customers

The CellNet system is a breakthrough in the application of wireless technologies for data communications. A complete, integrated solution, the system helps utilities foster closer ties with—and better meet the needs of—their customers, while helping to improve utility operational efficiency.

Using a three-tiered client/server network architecture, the CellNet system provides a powerful communications channel for collecting, processing, and delivering valuable information—in real time.

The system is designed to provide two-way communications capabilities—across all levels of the network—that are scalable, reliable, and economical. An open, standards-based architecture ensures system flexibility and smooth, easy integration with existing utility systems.

Three integrated networks

The CellNet system is comprised of a hierarchy of three tightly integrated networks:

System Controller Network

At the top of the hierarchy, the System Controller Network—functioning as the WAN server—manages overall

network communications and serves as the primary information access point for utilities; application gateways provide the interface between utility information systems and the CellNet system—allowing utilities to send and receive information on both a scheduled and on-demand basis.

Wireless Wide Area Network (WAN)

The CellNet WAN uses a digital radio system to provide data communications to the System Controller Network in a given region or service territory; a CellMaster at the center of each cell functions as the WAN router and typically covers a three- to five-mile radius.

Microcellular Local Area Network (LAN)

Each WAN, in turn, is made up of hundreds of microcellular LANs which operate independently to provide data communications from endpoint devices such as utility meters equipped with CellNet Communications Modules; a MicroCell Controller at the center of each microcell takes on the role of the LAN server and typically covers a one-quarter-mile radius.

Putting it all together

Working closely together, these three networks—joined by application-specific communications links—make up a complete system that is scalable, dependable, and rapidly deployable.

model of system hardware elements to utility applications through the application gateways. For example, the OMS handles on-demand meter read requests for unique addresses and rapidly returns the data to a utility's customer service application.

Optimized NOS

CellNet's proprietary Network Operating System (NOS) is optimized for maximum system performance. CellNet communications software, integrated into the NOS, keeps data flowing smoothly and efficiently throughout the network. Utility company personnel interact with CellNet's NOS through higher-level application gateways.

Rock-solid network management

Extensive, real-time diagnostic and network management functions operate continuously in the background, monitoring, managing, and maximizing network performance. Fault management functions, for example, detect network events—such as failure of backhaul transmission links from CellMasters—and take appropriate action. Other network management functions include performance, configuration, and security—all ensuring the highest degree of system dependability.

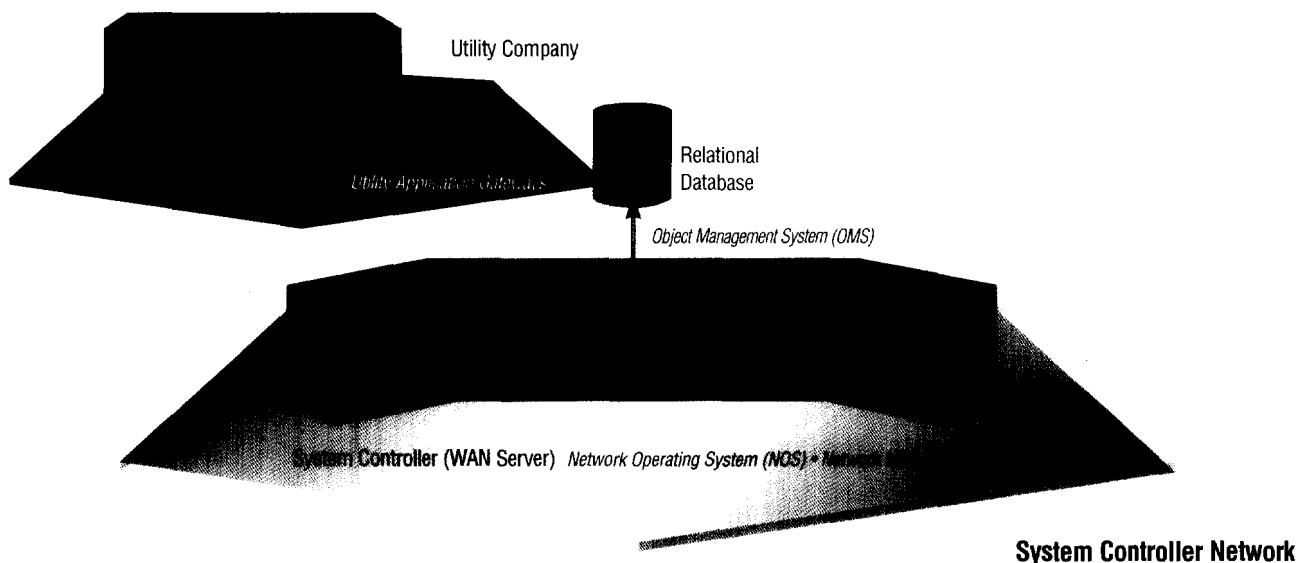
Disaster-Proof Reliability

The Central Operations Room at CellNet headquarters monitors the CellNet system 24-hours-a-day, 7-days-a-week, and can assume system functions at any moment for any region in the midst of, or recovering from, a natural disaster.

Since the CellNet Network Operating System is distributed among its networked workstations and servers, any network operator can manage the network or access information from any network location.

Fully redundant hardware throughout the system ensures no data is ever lost or unrecoverable.

Ruggedized CellMasters and MicroCell Controllers can withstand extreme weather conditions, ensuring dependable data communications when utilities, and their customers, need it most.



Wireless WAN:

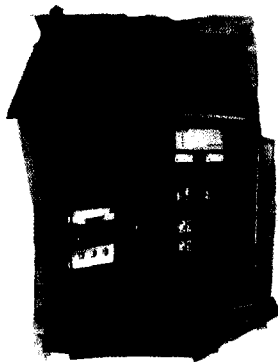
regional communications

Three- to five-mile radius

Each wide area network blankets a regional area with each cell typically deployed in a three- to five-mile radius. At the center of each cell is a fully redundant radio base station called a CellMaster, with up to 200 microcells "reporting" to it.

CellMaster

The CellMaster, installed in a wide variety of locations, acts as a router on the WAN, continuously scanning its WAN clients (hundreds of MicroCell Controllers and Remote Terminal Units within a service territory) using digital radio communications technology. Once it has collected information, the CellMaster routes it via dedicated links to the System Controller at the local CellNet Operations Center.



CellMaster



*MicroCell
Controller*

CellMasters are designed for reliability. Ruggedized to withstand extreme weather conditions, they are built with fully redundant hardware and will automatically switch over to the backup system in case of failure. Battery backup ensures operation during outages.

MicroCell Controller

Typically installed on utility poles, buildings, or street lights, the MicroCell Controller functions as both a client on the WAN and the server on the LAN. It collects and stores information from CellNet Communications Modules, performs initial data processing and filtering, then forwards the processed data to the System Controller via the CellMaster.

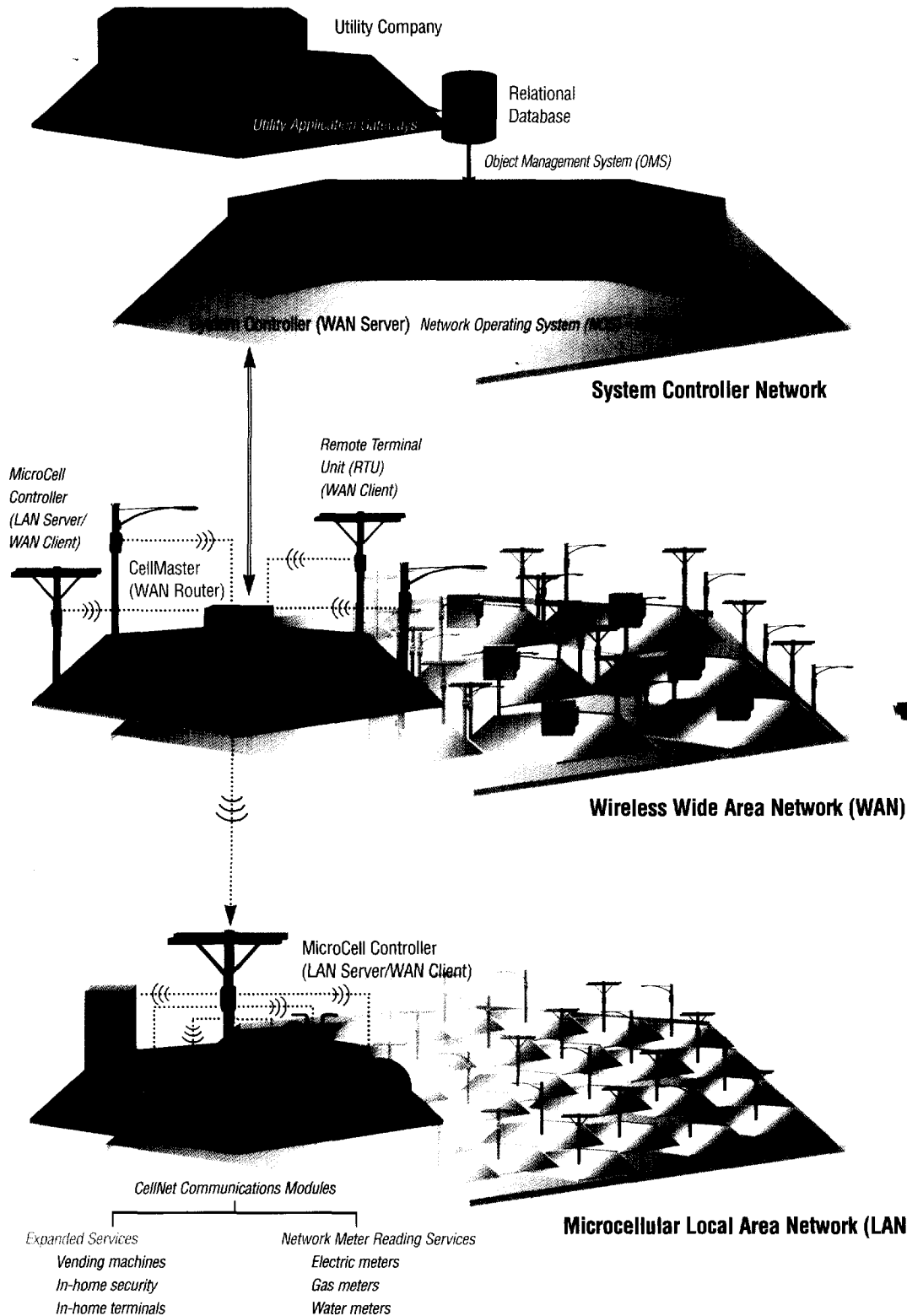
The MicroCell Controller is a "smart" node on the network, going beyond information routing to provide intelligent data processing. The MicroCell Controller has built-in outage detection and voltage monitoring features. Battery backup ensures operation during outages.

Flexible, Scalable Architecture

CellNet's open, standards-based system architecture ensures that future systems and technologies can be easily integrated to *accommodate changing needs* while protecting a utility's existing network infrastructure investments.

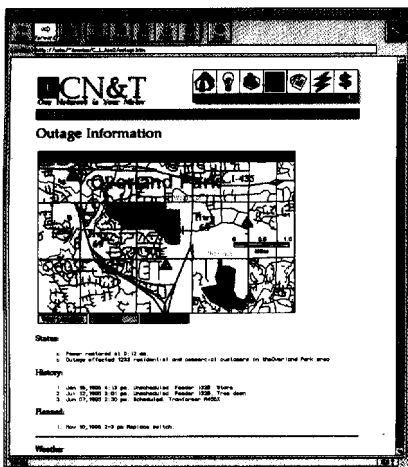
Isolating each underlying network technology provides a high degree of adaptability; for example, in a rural area, the CellNet network may employ satellite or telephone links in addition to other digital radio links if needed.

Because the CellNet system is flexible and scalable, once deployment begins, new capabilities can be easily added via remote software upgrades, to meet growing capacity and/or service needs.



System Controller Network: *the information gateway*

Utilities can pinpoint and resolve outages faster than ever before with CellNet Network Meter Reading services.

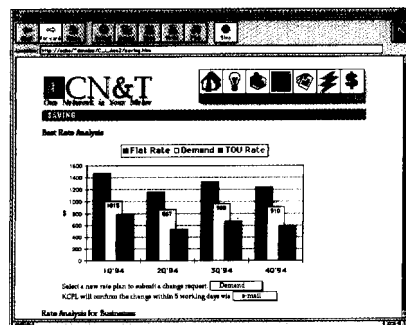


A network of UNIX-based servers

The System Controller Network—responsible for managing the overall CellNet system—is located at the local CellNet Operations Center and consists of a network of UNIX-based servers and workstations. The System Controller communicates with WAN clients and routers on one side and utility information systems on the other side via a dedicated backhaul such as leased lines, microwave, and point-to-point radio.

Many access points

The System Controller collects data from throughout the system and loads it into a relational database. Utility companies, in turn, access the information via utility application gateways using industry-standard TCP/IP protocols. (OSI and other utility communications architecture standards are also supported.)



These customized gateways deliver data to utility applications in familiar, ready-to-use formats, and support two basic access methods: batch time (e.g., file transfers) and real time (e.g., interactive queries). The gateways are equipped with tools and interfaces—such as SQL interfaces—for custom UNIX application development by utilities.

Utilities can access information in two basic ways: on a regularly scheduled basis (e.g., batch files generated every 24 hours), or on an interactive real-time basis (e.g., accessing real-time usage during a customer service call).

A firewall between the System Controller and the utility network ensures secure data transfer and prevents unauthorized access.

OMS data model

The CellNet Object Management System (OMS) wraps together a proprietary, distributed, object-oriented database and a distributed messaging system. The OMS provides a software

With real-time, on-line access to customer meter information, utilities can offer customers new services such as real-time pricing, time-of-use rates, and best-rate analysis.